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AUTHOR Gropper, George L.
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ABSTRACT

This document, one of five volumes comprising a training program on instructional materials development designed for educational research and development personnel, gives an overview of the program and provides practice in using the materials. This volume is divided into five sections describing the purposes of this orientation manual. Section 1 provides an overview of the materials development process. Section 2 provides initial practice in using the handbook. Section 3 provides initial practice in doing workbook exercises associated with specific sections of the handbook. Section 4 provides initial practice in doing the final exercises that are performed upon completion of each subvolume of the handbook. Section 5 introduces key concepts applicable to all major tasks in the development process. (PD)

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A Technology For Developing Instructional Materials

2 ORIENTATION

A. PLAN STUDY OF CRITERION BEHAVIORS

B. COLLECT AND ANALYZE DATA ABOUT CRITERION BEHAVIORS

C. SEQUENCE AND GROUP CRITERION BEHAVIORS

D. STATE CRITERION AND PREPARATORY OBJECTIVES

E. PLAN SIMULATION BASED ON INSTRUCTIONAL AND LOGISTICAL NEEDS

F. DEVELOP DIAGNOSTIC AND EVALUATIVE TESTS

G. FORMULATE INSTRUCTIONAL STRATEGIES

H. PLAN ACCOMMODATION OF INDIVIDUAL DIFFERENCES

I. DEVELOP INSTRUCTIONAL MATERIALS

J. EVALUATE INSTRUCTIONAL MATERIALS

AUTHOR:

George L. Gropper

Published by:

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Pittsburgh, Pennsylvania

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A Technology For Developing Instructional Materials

2 ORIENTATION

Volume Titles:

1. USER'S MANUAL
2. ORIENTATION
3. HANDBOOK
4. WORKBOOK
5. FINAL EXERCISES

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VOLUMES IN THIS SERIES

1. USER'S MANUAL
2. ORIENTATION
3. HANDBOOK
   (eleven sub-volumes)
4. WORKBOOK
5. FINAL EXERCISES

FOREWORD

This ORIENTATION volume is but one of five major volumes which comprise a training program on instructional materials development designed for educational R&D personnel. It was prepared to provide personnel taking the program with an overview of the program and with practice in using program materials.

The USER'S MANUAL describes the role each of the five major volumes is designed to play. It also prescribes the sequence in which each of the separate volumes is to be used. Personnel taking this program are, therefore, urged to read the instructions contained in the USER'S MANUAL before attempting to use this or any of the other separate volumes.

ACKNOWLEDGMENTS

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U.S.O.E. sponsorship does not in any way imply official endorsement of the views expressed in this volume.

George L. Gropper
March 1973

FIVE PURPOSES IN PROVIDING AN ORIENTATION TO THIS PROGRAM ON INSTRUCTIONAL TECHNOLOGY

		Page
Section (1)	provides you with an overview of the materials development process;	 3
Section (2)	provides you with initial practice in how to use the HANDBOOK;	 11
Section (3)	provides you with initial practice in how to do WORKBOOK exercises which are associated with specific sections of the HANDBOOK;	 65
Section (4)	provides you with initial practice in how to do FINAL EXERCISES which are done when you have finished a HANDBOOK sub-volume; and	 85
Section (5)	introduces key concepts which are applicable to all major tasks in the development process.	 89

Because of the novelty of the formats for displaying program information and because practice based on that information is required, this orientation may require a few hours of your time. The outlay will facilitate your subsequent use of program materials.

Where You Are Now

Section:

#1 OVERVIEW
#2 HANDBOOK
#3 WORKBOOK
#4 FINAL EXERCISES
#5 KEY CONCEPTS

Section (1)

Page

AN OVERVIEW
OF THE DEVELOPMENT PROCESS:

1a. TASKS 5

1b. STEPS 6

1c. Sub-STEPS 9

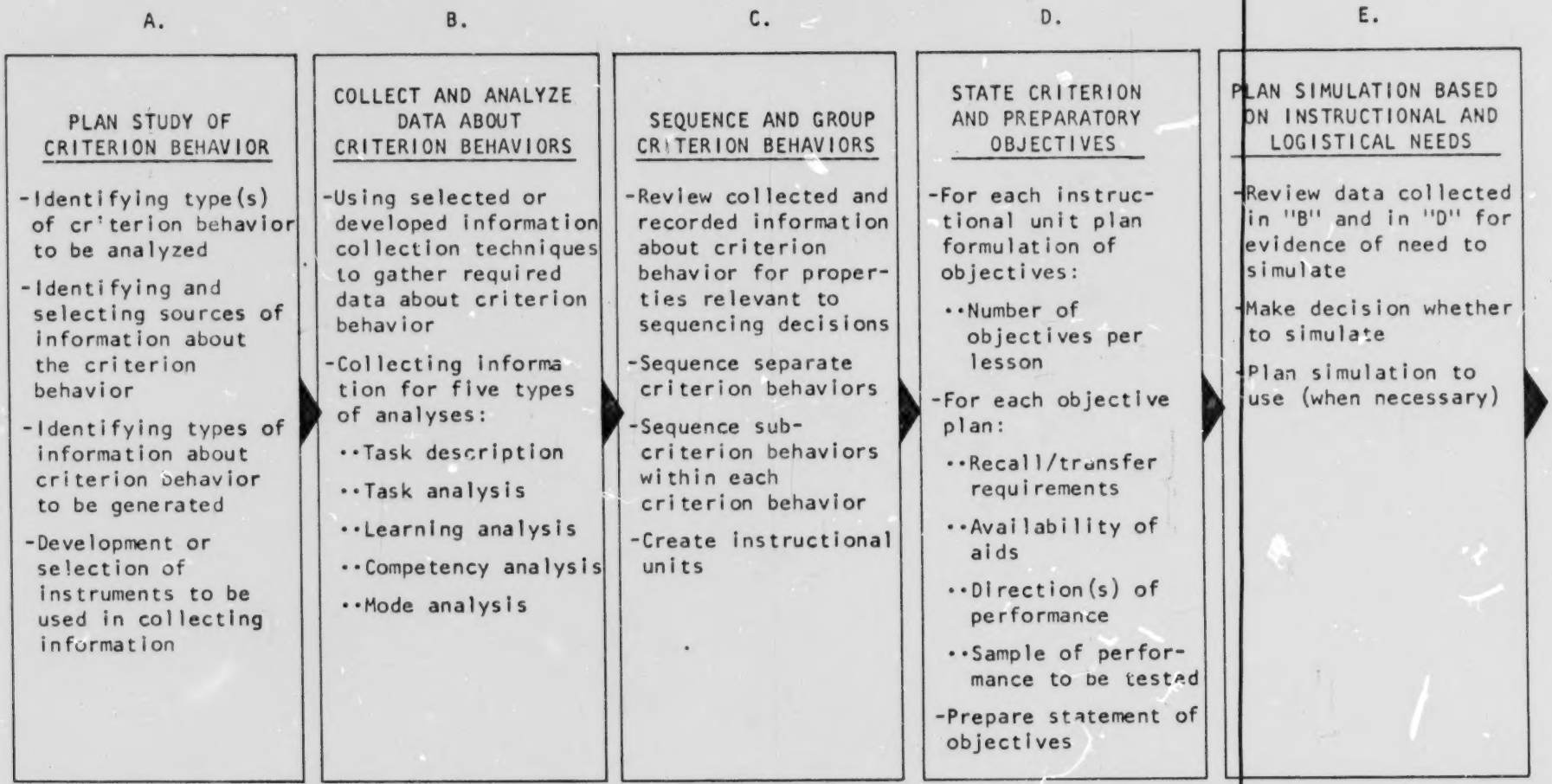
Do not attempt to memorize the content presented in this section. It is sufficient just to review it briefly in order to get the big picture of the types of Development Procedures which are covered by the entire program.

1a. Ten Major TASKS*

A.	PLAN STUDY OF CRITERION BEHAVIORS
B.	COLLECT AND ANALYZE DATA ABOUT CRITERION BEHAVIORS
C.	SEQUENCE AND GROUP CRITERION BEHAVIORS
D.	STATE CRITERION AND PREPARATORY OBJECTIVES
E.	PLAN SIMULATION BASED ON INSTRUCTIONAL AND LOGISTICAL NEEDS
F.	DEVELOP DIAGNOSTIC AND EVALUATIVE TESTS
G.	FORMULATE INSTRUCTIONAL STRATEGIES
H.	PLAN ACCOMMODATION OF INDIVIDUAL DIFFERENCES
I.	DEVELOP INSTRUCTIONAL MATERIALS
J.	EVALUATE INSTRUCTIONAL MATERIALS

* Each of ten HANDBOOK sub-volumes is devoted to each of these TASKS.

1b. STEPS within each of the major TASKS A-J.


A.
PLAN STUDY OF CRITERION BEHAVIOR
-Identifying type(s) of criterion behavior to be analyzed
-Identifying and selecting sources of information about the criterion behavior
-Identifying types of information about criterion behavior to be generated
-Development or selection of instruments to be used in collecting information
B.
COLLECT AND ANALYZE DATA ABOUT CRITERION BEHAVIORS
-Using selected or developed information collection techniques to gather required data about criterion behavior
-Collecting information for five types of analyses:
••Task description
••Task analysis
••Learning analysis
••Competency analysis
••Mode analysis
C.
SEQUENCE AND GROUP CRITERION BEHAVIORS
-Review collected and recorded information about criterion behavior for properties relevant to sequencing decisions
-Sequence separate criterion behaviors
-Sequence sub-criterion behaviors within each criterion behavior
-Create instructional units
D.
STATE CRITERION AND PREPARATORY OBJECTIVES
-For each instructional unit plan formulation of objectives:
••Number of objectives per lesson
-For each objective plan:
••Recall/transfer requirements
••Availability of aids
••Direction(s) of performance
••Sample of performance to be tested
-Prepare statement of objectives
E.
PLAN SIMULATION BASED ON INSTRUCTIONAL AND LOGISTICAL NEEDS
-Review data collected in "B" and in "D" for evidence of need to simulate
-Make decision whether to simulate
-Plan simulation to use (when necessary)

F.

DEVELOP DIAGNOSTIC AND EVALUATIVE TESTS

- -Plan types of tests to be developed and their number
- -Develop criterion test
- -Develop diagnostic tests
- -Give tests preliminary tryout

G.

FORMULATE INSTRUCTIONAL STRATEGIES

- -Based on previous analyses and on tests, design criterion practice
- -Design preparatory practice leading up to criterion practice
- -Plan behavior control during practice
- -Select media appropriate to above plans

H.

PLAN ACCOMMODATION OF INDIVIDUAL DIFFERENCES

- -Identify ways to accommodate individual differences in:
  - ••Groups of students
  - ••Individual students

I.

DEVELOP INSTRUCTIONAL MATERIALS

- -Plan how much of criterion behavior can be practiced at the same time
- -Plan the order in which parts of criterion behavior will be practiced
- -Develop instructional materials reflecting decisions made in "G" and "H"

J.

EVALUATE INSTRUCTIONAL MATERIALS

- -Conduct informal tryout of instructional materials and make necessary revisions
- -Conduct developmental tryout and make necessary revisions in instructional materials
- -Conduct field tryouts and report proficiency levels attained by students

1c. Sub-STEPS Within STEPS

NOW, BRIEFLY REVIEW THE "INDEX" OR "X" SUB-VOLUME OF THE HANDBOOK TO FAMILIARIZE YOURSELF WITH THE SUB-STEPS WITHIN STEPS IN THE DEVELOPMENT PROCESS.*

WHEN YOU HAVE COMPLETED YOUR REVIEW, CONTINUE ON IN THIS VOLUME.

*You are not required at this time to learn or memorize the material you are reviewing. The review is designed merely to give you an orientation to or an overview of what's involved in the development process. Therefore, keep your review of the "index" volume deliberately brief.

Where You Are Now

Section:

#1 OVERVIEW
#2 HANDBOOK
#3 WORKBOOK
#4 FINAL EXERCISES
#5 KEY CONCEPTS

Section (2) Page

DESCRIPTION OF THE HANDBOOK

2a. Labels and Numbering 13
2b. Format 15
2c. Diagrams 27
2d. Indexes 47
2e. Sequences 57
2f. Information Needs 61

2a. HANDBOOK Labels and Numbering

- Each of the ten major TASKS in the development process has a HANDBOOK sub-volume devoted to it. There are ten sub-volumes labeled A-J. The eleventh or Index sub-volume is labeled X.

- STEPS within each TASK and sections of each sub-volume devoted to them are labeled with the task letter and a step number:

  e.g., A.1, A.2, A.3, etc., B.1, B.2, B.3, etc., C.1, C.2, C.3, etc.

- Sub-STEPS within each STEP and sections of each sub-volume devoted to them are labeled with: a task letter, a step number, and a sub-step number:

  e.g., A.1.1, A.1.2, A.1.3, etc., A.2.1, A.2.2, A.2.3, etc., A.3.1, A.3.2, A.3.3, etc., B.1.1, B.1.2, B.1.3, etc., B.2.1, B.2.2, B.2.3, etc.

2b. HANDBOOK Format

This section is designed to familiarize you with techniques used in each HANDBOOK sub-volume to identify beginnings and ends of sections and sub-sections.

MARKING THE BEGINNINGS AND ENDINGS OF HANDBOOK SECTIONS

Each HANDBOOK sub-volume contains specific types of pages to help you identify:

- ··all the STEPS and Sub-STEPS within the task covered by a sub-volume
- ··the beginning of a section devoted to a STEP
- ··the beginning of a sub-section devoted to a Sub-STEP
- ··the end of a TASK, STEP, or Sub-STEP

The next several pages illustrate these especially designed "marker" pages. Review them briefly to familiarize yourself with them and their location. No memorization is required.

2b.1 MARKING THE BEGINNING OF A "TASK"

1. Each new TASK begins with a new HANDBOOK sub-volume. An overview of all the STEPS and Sub-STEPS within a given TASK appears at the beginning of each HANDBOOK sub-volume. The one on the opposite page was taken from HANDBOOK sub-volume "C".

2. Note in the illustration that pages iv and v identify:

   ··the TASK covered in the "C" volume;

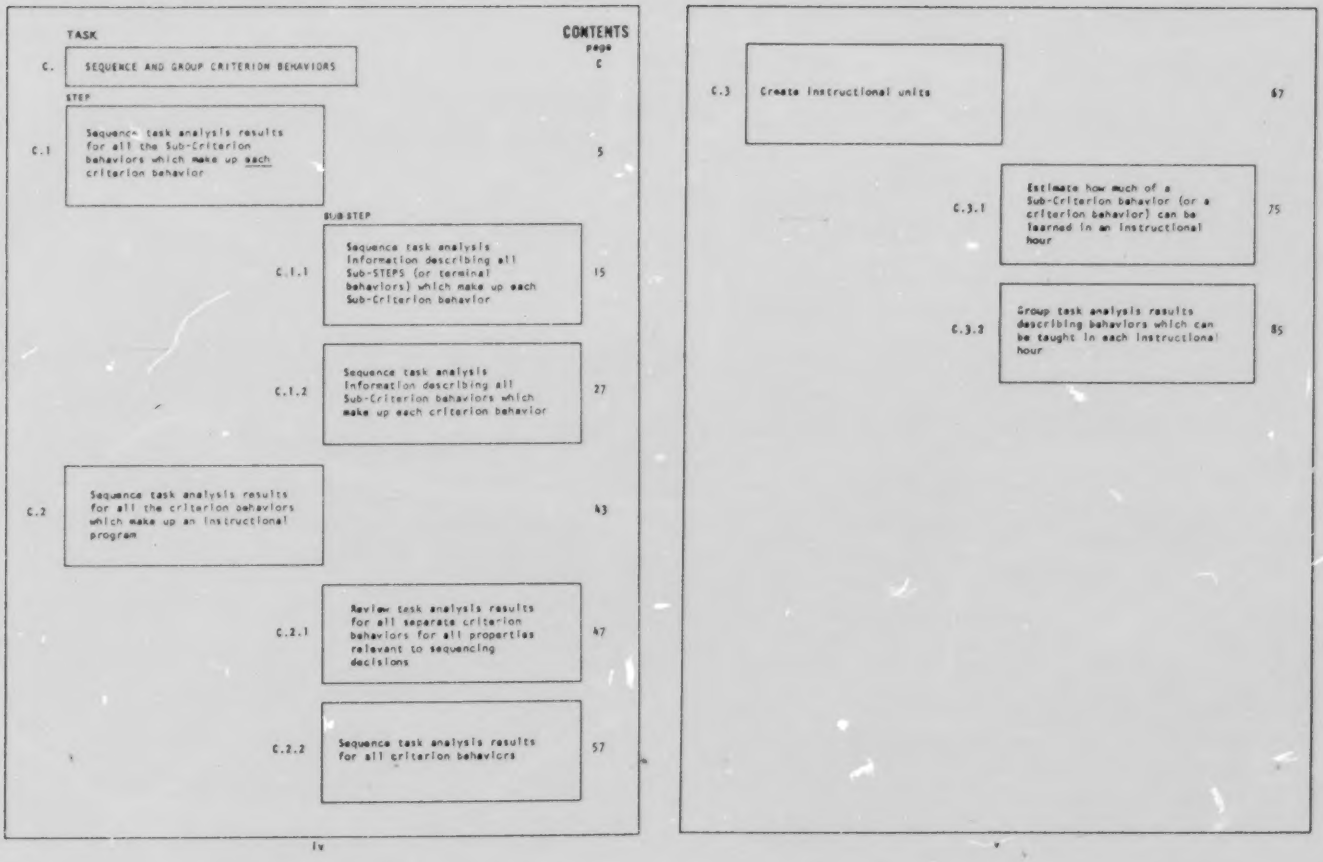
   ··the three STEPS which make up that task: (C.1, C.2, and C.3); and

   ··the six Sub-STEPS (two to each STEP) which make up the steps: (C.1.1, C.1.2, C.2.1, C.2.2, C.3.1, and C.3.2).

3. Open HANDBOOK sub-volume "C" to pages iv and v so that you will become familiar with the location of this type of overview.

4. Then, continue this orientation exercise on page 20 of this volume.

EXAMPLE*


TASK
CONTENTS
page
C.
SEQUENCE AND GROUP CRITERION BEHAVIORS
C
STEP
C.1
Sequence task analysis results for all the Sub-Criterion behaviors which make up each criterion behavior
5
SUB STEP
C.1.1
Sequence task analysis information describing all Sub-STEPS (or terminal behaviors) which make up each Sub-Criterion behavior
15
C.1.2
Sequence task analysis information describing all Sub-Criterion behaviors which make up each criterion behavior
27
C.2
Sequence task analysis results for all the criterion behaviors which make up an instructional program
43
C.2.1
Review task analysis results for all separate criterion behaviors for all properties relevant to sequencing decisions
47
C.2.2
Sequence task analysis results for all criterion behaviors
57
C.3
Create instructional units
67
C.3.1
Estimate how much of a Sub-Criterion behavior (or a criterion behavior) can be learned in an instructional hour
75
C.3.2
Group task analysis results describing behaviors which can be taught in each instructional hour
85

iv

* *(1) This example is used for illustrative purposes only.*

(2) Succeeding sections will consist of a lefthand page (like page 18) which instructs you what to look for and a righthand page (like this one) which provides an example of types of pages to be found in the HANDBOOK.

(3) Make no attempt to memorize the content of these pages or to write on them.

2b.2 MARKING THE BEGINNING OF A "STEP"

1. An overview of all the Sub-STEPS within a STEP appears at the beginning of all major sections within a HANDBOOK sub-volume. The one on the opposite page was taken from the first major section of HANDBOOK sub-volume "C".

2. Note in the opposite illustration that page 5 identifies:

   ··the STEP covered in the section which begins with that page (C.1); and

   ··the two Sub-Steps which make up that STEP (C.1.1 and C.1.2).

3. In the HANDBOOK volume the illustrated page appears on colored paper. Using HANDBOOK sub-volume "C" again, refer to pages 5, 43, and 67 for examples of color-coded pages which mark the beginning of the three STEPS (C.1, C.2, and C.3) involved in TASK C.

4. Then, continue this orientation exercise on page 22 of this volume.

EXAMPLE

STEP C.1

C.1 Sequence task analysis results for all the Sub-Criterion behaviors which make up each criterion behavior.

C.1.1 Sequence task analysis information describing all Sub-STEPS (or terminal behaviors) which make up each Sub-Criterion behavior.

C.1.2 Sequence task analysis information describing all Sub-Criterion behaviors which make up each criterion behavior.*

*There is ample opportunity during TASK "G" (STRATEGY FORMULATION) to change sequencing decisions in light of additional information.

2b.3 MARKING THE BEGINNING OF A "SUB-STEP"

1. There is a HANDBOOK sub-section for each Sub-STEP in the development process. The beginning of the sub-section is identified by a page like the one to the right. It was taken from HANDBOOK sub-volume "C".

2. Note in the illustration that there are three parts to such a "marker" page:

   ··at the top: a capsule description of what is performed in the particular Sub-STEP;

   ··in the middle: a listing of the HANDBOOK contents having a bearing on the performance of that Sub-STEP; and

   ··at the bottom: a listing of materials or procedures previously completed (in prior STEPS or Sub-STEPS) and required for the performance of the current Sub-STEP.

   In a later section more orienting information will be supplied about this type of page.

3. In Volume "C", note examples of this type of page with which sections on Sub-STEPS begin; they can be found on pages: 15, 27, 47, 57, 75, and 85 (a marker page for each of the six Sub-STEPS that make up TASK C).*

4. Then, continue this orientation exercise on page 24 of this volume.

* *Lefthand overview pages precede each of these six pages.*
In volume C, look at pages 14, 26, 46, 56, 74, and 84.

STEP C.1

C.1 Sequence task analysis results for all the Sub-Criterion behaviors which make up each criterion behavior.

C.1.1 Sequence task analysis information describing all Sub-STEPS (or terminal behaviors) which make up each Sub-Criterion behavior.

C.1.2 Sequence task analysis information describing all Sub-Criterion behaviors which make up each criterion behavior.*

*There is ample opportunity during TASK "G" (STRATEGY FORMULATION) to change sequencing decisions in light of additional information.

2b.3 MARKING THE BEGINNING OF A "SUB-STEP"

1. There is a HANDBOOK sub-section for each Sub-STEP in the development process. The beginning of the sub-section is identified by a page like the one to the right. It was taken from HANDBOOK sub-volume "C".

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   - ··at the top: a capsule description of what is performed in the particular Sub-STEP;
   - ··in the middle: a listing of the HANDBOOK contents having a bearing on the performance of that Sub-STEP; and
   - ··at the bottom: a listing of materials or procedures previously completed (in prior STEPS or Sub-STEPS) and required for the performance of the current Sub-STEP.

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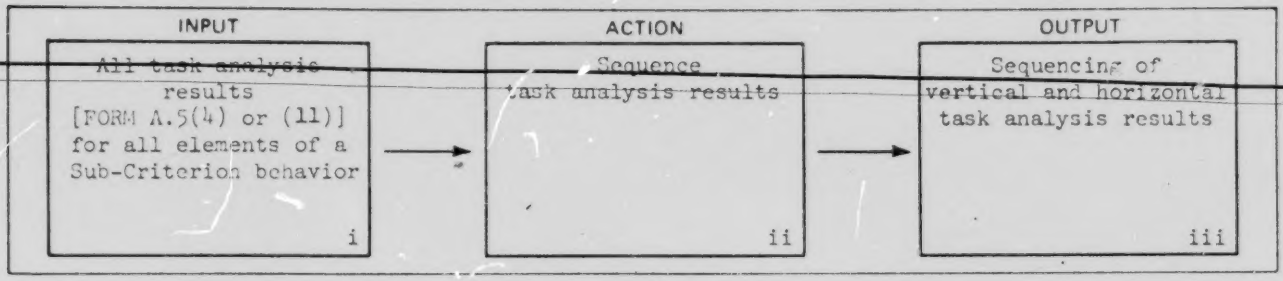
4. Then, continue this orientation exercise on page 24 of this volume.

DESCRIPTION OF Sub-STEP	C.1.1



Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
-MATRIX: What are vertical and horizontal results . . .18, 19	-MATRIX: How to sequence vertical and horizontal task analysis results . . 20, 21	-MATRIX: Adequacy of sequencing of task analysis results 25	SUMMARY OF PROCEDURES . . . 24

Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
		Task analysis results on FORMS A.5(4) or (11) (carried forward from)	B.5	

2b.4 MARKING THE "ENDINGS" OF TASKS, STEPS, AND SUB-STEPS

1. A separate sub-volume is devoted to each of the ten TASKS in the development process. The end of the sub-volume marks the end of the TASK described in it.
2. The end of each STEP within a task is marked by a completion checklist like the one on the opposite page. It identifies what should have been accomplished when all the Sub-STEPS within the STEP have been completed.
3. In sub-volume "C", for the examples of completion checklists marking the end of a STEP, note pages 41, 65, and 91 (for each of the three STEPS in TASK C).
4. The end of each Sub-STEP is identified by the marker page identifying the beginning of the next Sub-STEP.
5. Continue this orientation exercise on page 27 of this volume.

STEP C.1

COMPLETION CHECKLIST

	IDENTIFIED	PERFORMED	PRODUCED	FORMS COMPLETED
C.1.1		Elements within a sub-criterion behavior sequenced		
C.1.2		Sub-criterion behaviors sequenced relative to one another		

2c. Diagramming HANDBOOK INFORMATION

In the HANDBOOK heavy reliance is placed on diagrammed formats. Spatial grouping and spatial separation of information is used in order to facilitate either the comparison or differentiation of information.

This section of the orientation volume is designed to familiarize you with the varied types of diagramming formats which have been used. They include diagrams which identify:

..2c.1 diagramming job procedures

..2c.2 information on ways to carry out job procedures

2c.1 Diagramming Job Procedures

..The basic job diagram

..The detailed job diagram

THE BASIC JOB DIAGRAM

1. Illustrated at the top of the opposite page there are three elements to the basic job diagram: an INPUT, an ACTION, and an OUTPUT.

2. These three elements can be defined as follows:

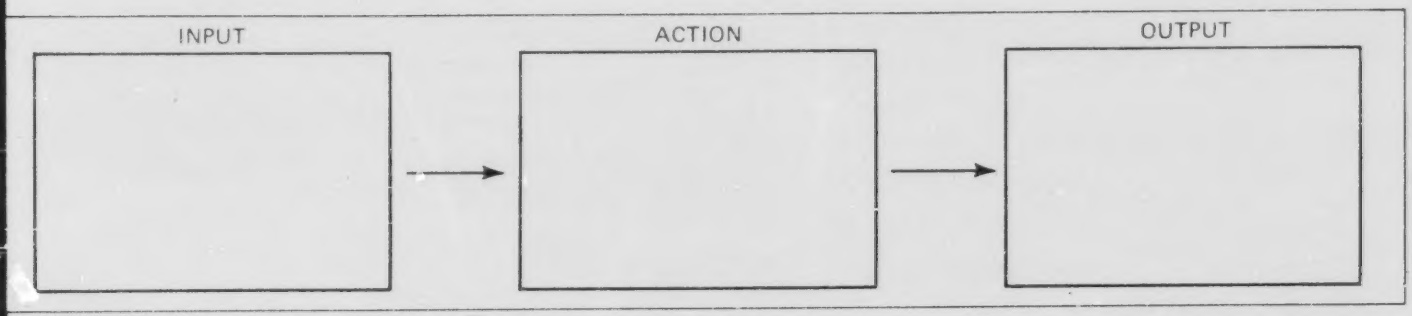
   - an INPUT refers to the stimulus or stimulus situation a person is faced with or has to deal with. It can include such things as: a signal, a physical or psychological situation, an object or a person, words on a page, etc.

   - an ACTION refers to the response the person makes to the INPUT. It can include such things as: talking, writing, walking, manipulating, etc.

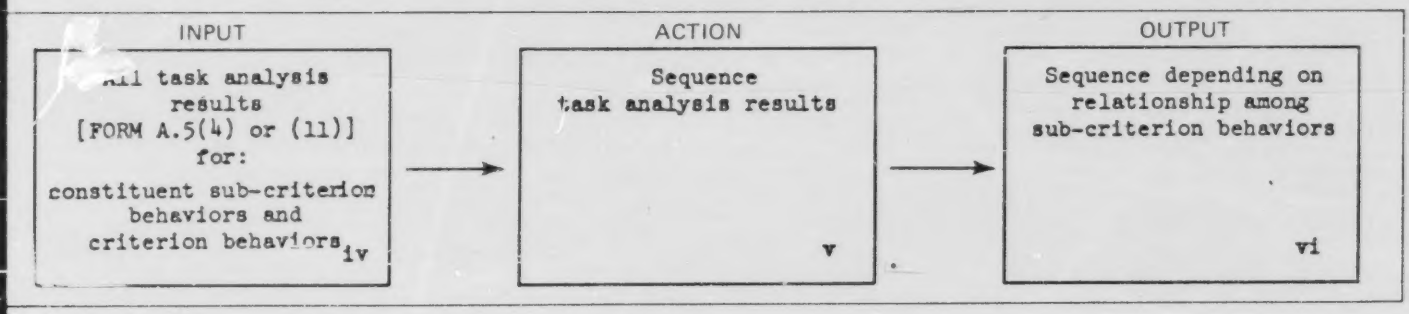
   - an OUTPUT refers to the outcome or result of the ACTION the person has taken. This can include such things as: a change in the condition of an object, person, or situation; a physical or verbal product; etc.

3. Note the example on the bottom half of the opposite page. It was taken from HANDBOOK sub-volume "C". The developer, according to this diagram, is faced with or is given as an INPUT completed results of a task analysis written up on special forms. The ACTION he takes is to sequence the forms containing these results. The OUTPUT is a sequenced set of task analysis forms.

4. Continue the orientation on page 32 of this volume.


INPUT
ACTION
OUTPUT

An EXAMPLE


INPUT
ACTION
OUTPUT
All task analysis results [FORM A.5(4) or (11)] for: constituent sub-criterion behaviors and criterion behaviors iv
Sequence task analysis results
v
Sequence depending on relationship among sub-criterion behaviors
vi

THE DETAILED JOB DIAGRAM

1. The illustration on the opposite page shows how the basic job diagram (the top row) can be broken down into a more detailed job diagram (the bottom three rows).

2. In the left-hand column are represented three different variations (iv.a, iv.b, & iv.c) of the INPUT (at the top) which may be encountered.

   In the example shown here, task analysis results may reveal one of the three conditions described in the diagram.

3. In the middle column are represented three different variations (v.a, v.b, & v.c) of the ACTION (at the top) which may be taken.

   These are the range of ACTIONS which can be taken. Which ACTION is taken depends on the INPUT situation the development specialist is faced with.

4. In the right-hand column are represented three different variations (vi.a, vi.b, & vi.c) of the OUTPUT (at the top) which may result.

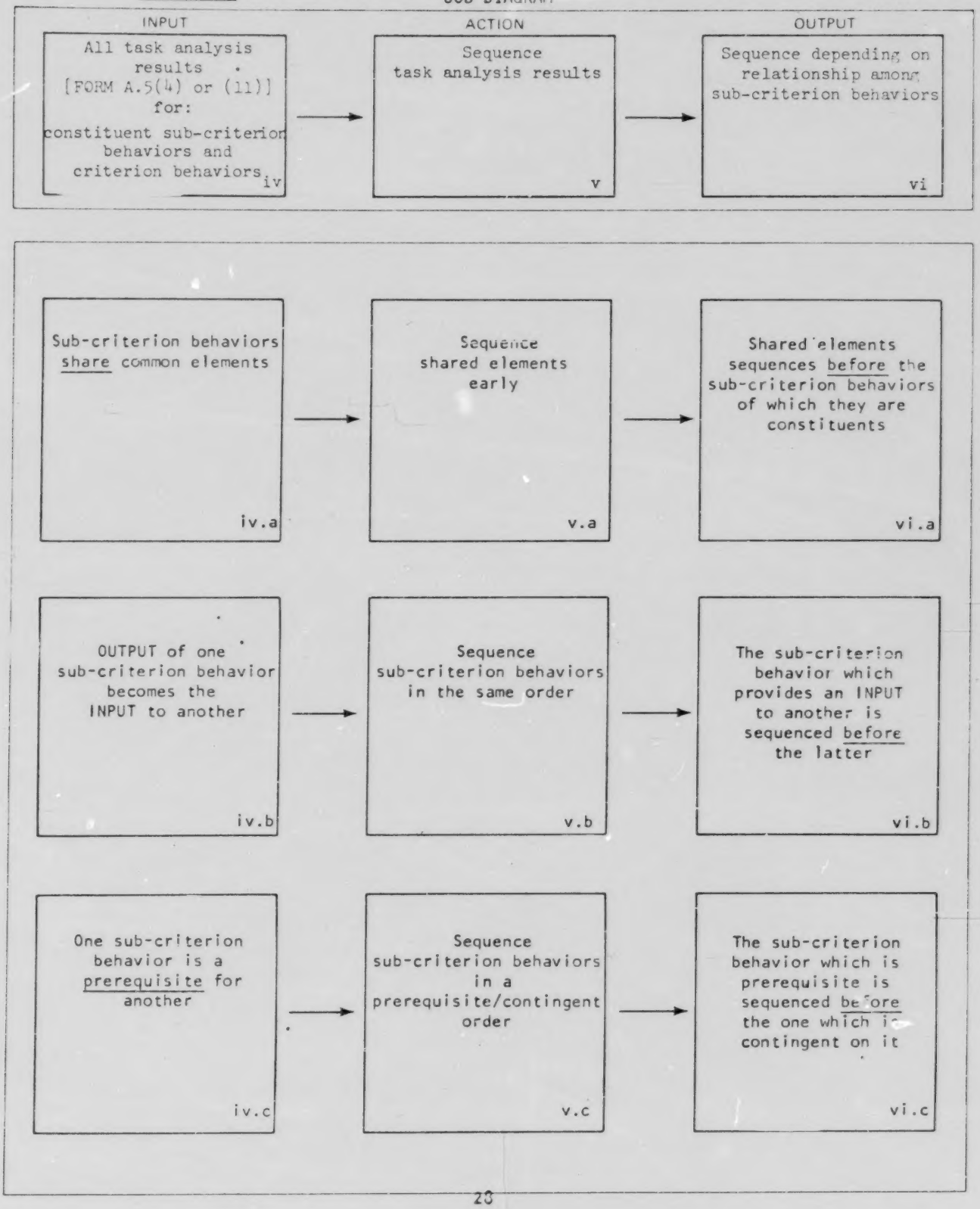
   These are the range of OUTPUTS which can result, the actual OUTPUT occurring depending on which ACTION is taken.

5. For other examples of the basic job diagram and their associated detailed job diagrams, refer in sub-volume "C" to pages 16, 26, 48, 58, 76, & 86.

6. Continue the orientation exercise on page 35 of this volume.

Sub-STEP C.1.2

JOB DIAGRAM


INPUT
ACTION
OUTPUT
All task analysis results [FORM A.5(4) or (11)] for: constituent sub-criterion behaviors and criterion behaviors
iv
Sequence task analysis results
v
Sequence depending on relationship among sub-criterion behaviors
vi
Sub-criterion behaviors share common elements
iv.a
Sequence shared elements early
v.a
Shared elements sequences before the sub-criterion behaviors of which they are constituents
vi.a
OUTPUT of one sub-criterion behavior becomes the INPUT to another
iv.b
Sequence sub-criterion behaviors in the same order
v.b
The sub-criterion behavior which provides an INPUT to another is sequenced before the latter
vi.b
One sub-criterion behavior is a prerequisite for another
iv.c
Sequence sub-criterion behaviors in a prerequisite/contingent order
v.c
The sub-criterion behavior which is prerequisite is sequenced before the one which is contingent on it
vi.c

2c.2 Information on Ways to Carry Out Job Procedures

- The basic diagram for presenting information
- The identification matrix
- The decision matrix
- The standards matrix

THE BASIC INFORMATION DIAGRAM

1. The opposite page provides an example of the type of information diagram which appears throughout the HANDBOOK.

2. The advantages of the diagram as a means of organizing and presenting information is as follows:

   ••it uses spatially separate columns as a means of differentiating or distinguishing between ideas, concepts, techniques, etc. (In the illustration, three conditions are identified and differentiated from one another.)

   ••it uses one diagram to summarize and provide an overview of or a big picture of interrelated ideas, concepts, techniques, etc. instead of presenting each one singly and only afterwards trying to interrelate them.

3. Note that there are four parts to a diagram:

   ••a diagram title (appearing in a rectangle at the top);

   ••the labels or headings for the concepts or ideas situations, or conditions being presented (appearing in the top-most row);

   ••criteria which define the concepts or ideas or conditions (appearing in the second row); and

   ••multiple examples of the concepts or conditions (appearing in the bottom row).

4. In reading the diagram, it makes no difference whether you read across rows or down columns. Personal preference will dictate which approach you use. However you approach it, what you should come away with is the ability to:

   ••see what the differences are between the concepts or conditions being compared (across columns);

   ••see the similarities among varied related examples (within a single column); and

   ••associate a label with its appropriate definition and examples.

5. Your learning task is not to memorize definitions or to memorize examples. Your task is to understand the concepts presented in the diagrams. Operationally this means to be able to distinguish between contrasting concepts or situations and to see similarities among examples within a given class of situations.

6. Continue the orientation exercise on page 39 of this volume.

C.1.2
IDENTIFICATION MATRIX

CONDITIONS TO BE CONSIDERED WHEN DETERMINING THE SEQUENCE OF TASK ANALYSIS RESULTS FOR EACH SUB-CRITERION BEHAVIOR RELATIVE TO OTHER CONSTITUENT SUB-CRITERION BEHAVIORS

CONDITIONS	1 Sub-Criterion Behaviors SHARE COMMON ELEMENTS	2 One Sub-Criterion Behavior PROVIDES AN INPUT to another Sub-Criterion Behavior	3 One Sub-Criterion Behavior IS A PREREQUISITE for another Sub-Criterion Behavior
CRITERIA	-*Two or more sub-criterion behaviors analyzed to lower or specific levels of detail are revealed to share:* ••*One or more Sub-STEPS (for performance) or terminal behaviors (for knowledge domain)* *OR* ••*One or more component skills (i.e., discriminations, generalizations, or associations)*	-*A sub-criterion behavior results in a final OUTPUT which, in turn, becomes an INPUT for another sub-criterion behavior (a horizontal relationship)*	-*The mastery of one sub-criterion behavior is contingent on the prior mastery of another sub-criterion behavior* -*These sub-criterion behaviors are thus in a vertical relationship to one another (i.e., a lower level task analysis of the contingent sub-criterion behavior would reveal the prerequisite one)* -*They are not in a coordinate, horizontal relationship*
EXAMPLES	e.g., PLAYING BRIDGE -*In both "play" and "bidding," the player has to be able (among other things) to:* ••*Identify suits* ••*Identify honor cards and numbered cards* ••*Identify higher and lower cards*	e.g., COMPUTING STATISTICS -*The OUTPUT of a computational Sub-STEP, treated as a sub-criterion behavior (e.g., the value of t)* -*Becomes the INPUT for another Sub-STEP (i.e., looking up the significance in a table), also treated as a sub-criterion behavior*	e.g., PHYSICS -*The concepts of "force" and "pressure" are initially treated as coordinate sub-criterion behaviors* -*Further analysis shows that dealing with "pressure" is contingent on being able to deal with "force" (i.e., a lower level concept)*

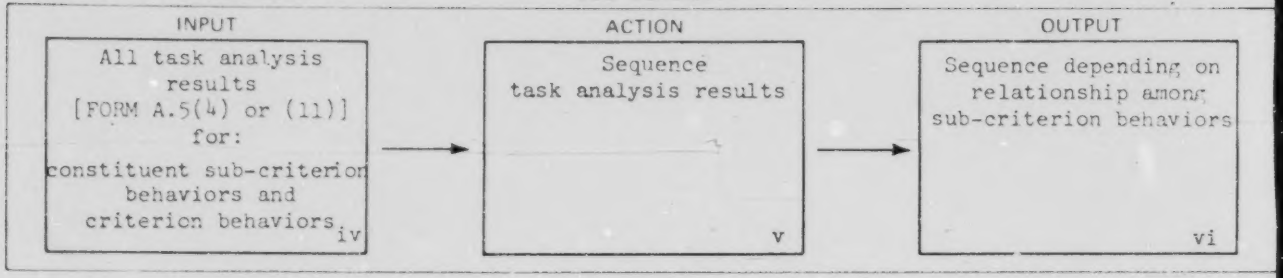
The next several pages will illustrate three types of diagrams which provide information bearing on the detailed job diagram which you reviewed earlier.

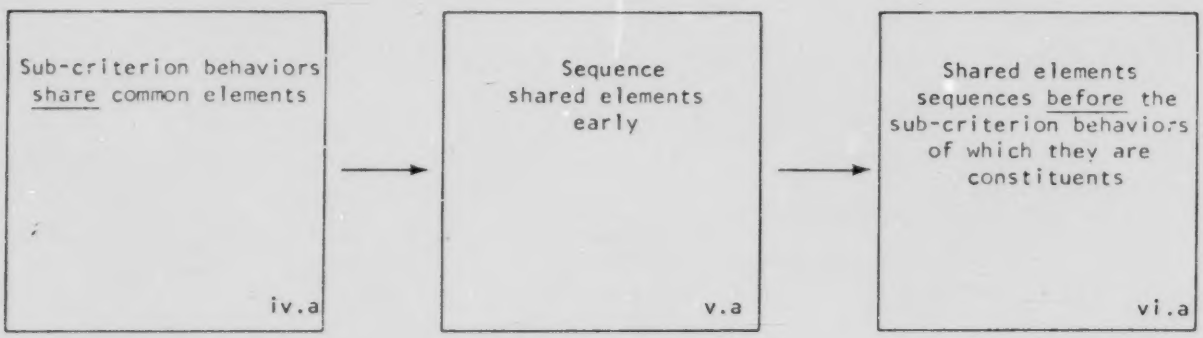
A copy of the detailed job diagram appears inside this foldout exhibit. Refer to it as you review the next several pages.

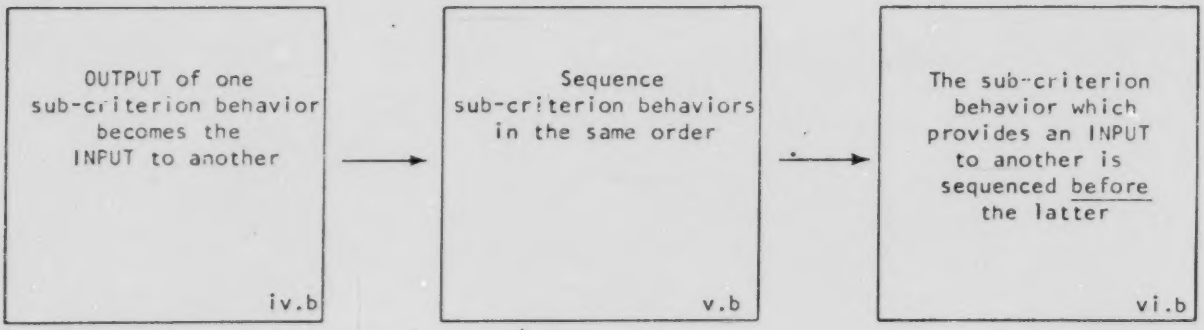
FOLD OUT
THIS PAGE

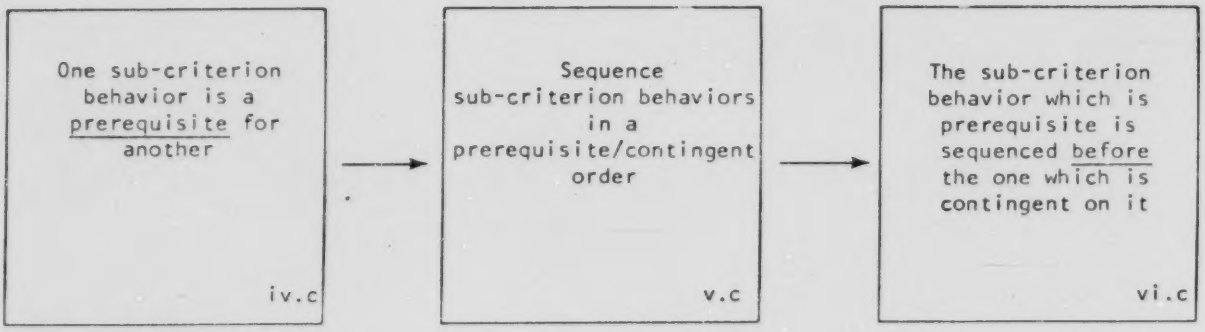
Sub-STEP C.1.2

JOB DIAGRAM




Sub-criterion behaviors share common elements
iv.a
Sequence shared elements early
v.a
Shared elements sequences before the sub-criterion behaviors of which they are constituents
vi.a


OUTPUT of one sub-criterion behavior becomes the INPUT to another
iv.b
Sequence sub-criterion behaviors in the same order
v.b
The sub-criterion behavior which provides an INPUT to another is sequenced before the latter
vi.b


One sub-criterion behavior is a prerequisite for another
iv.c
Sequence sub-criterion behaviors in a prerequisite/contingent order
v.c
The sub-criterion behavior which is prerequisite is sequenced before the one which is contingent on it
vi.c

AN IDENTIFICATION MATRIX

1. The illustrative detailed job diagram appearing to the left on page 39a indicates that the development specialist has to determine which of three INPUT situations, iv.a, iv.b, or iv.c he is dealing with. For the particular objectives he wishes to teach, his task analysis results reveal three possibilities: (1) "the sub-criterion behaviors share a common element"; (2) "the OUTPUT of one sub-criterion behavior becomes the INPUT to another"; or (3) "one sub-criterion behavior is a pre-requisite to another." He must decide which of the three applies to his subject matter.

2. The "identification matrix" appearing to the right on page 41 provides criteria to help the specialist decide which one of these three conditions he is faced with in what he is now trying to teach.

3. Generally, the identification matrix is designed to assist you as a materials developer in determining which of two or more INPUT situations you may be dealing with for each and every Sub-STEP in the development process.

4. Turn to page 42 in this volume for a description of a second type of matrix.

C.1.2
IDENTIFICATION
MATRIX

CONDITIONS TO BE CONSIDERED WHEN DETERMINING THE SEQUENCE OF TASK ANALYSIS RESULTS FOR EACH SUB-CRITERION BEHAVIOR RELATIVE TO OTHER CONSTITUENT SUB-CRITERION BEHAVIORS

CONDITIONS	1 Sub-Criterion Behaviors SHARE COMMON ELEMENTS	2 One Sub-Criterion Behavior PROVIDES AN INPUT to another Sub-Criterion Behavior	3 One Sub-Criterion Behavior IS A PREREQUISITE for another Sub-Criterion Behavior
CRITERIA	-*Two or more sub-criterion behaviors analyzed to lower or specific levels of detail are revealed to share:* ••*One or more Sub-STEPS (for performance) or terminal behaviors (for knowledge domain)* *OR* ••*One or more component skills (i.e., discriminations, generalizations, or associations)*	-*A sub-criterion behavior results in a final OUTPUT which, in turn, becomes an INPUT for another sub-criterion behavior (a horizontal relationship)*	-*The mastery of one sub-criterion behavior is contingent on the prior mastery of another sub-criterion behavior* -*These sub-criterion behaviors are thus in a vertical relationship to one another (i.e., a lower level task analysis of the contingent sub-criterion behavior would reveal the prerequisite one)* -*They are not in a coordinate, horizontal relationship*
EXAMPLES	e.g., PLAYING BRIDGE -*In both "play" and "bidding," the player has to be able (among other things) to:* ••*Identify suits* ••*Identify honor cards and numbered cards* ••*Identify higher and lower cards*	e.g., COMPUTING STATISTICS -*The OUTPUT of a computational Sub-STEP, treated as a sub-criterion behavior (e.g., the value of t)* -*Becomes the INPUT for another Sub-STEP (i.e., looking up the significance in a table), also treated as a sub-criterion behavior*	e.g., PHYSICS -*The concepts of "force" and "pressure" are initially treated as coordinate sub-criterion behaviors* -*Further analysis shows that dealing with "pressure" is contingent on being able to deal with "force" (i.e., a lower level concept)*

A DECISION MATRIX

1. Once a developer has determined which INPUT situation he is faced with, based on the information found in an identification matrix, he must then decide which ACTION to take.

2. The detailed job diagram on foldout page 39a shows the three possible ACTIONS to be taken, one for each of the three illustrative INPUT conditions. The illustrative "decision matrix" appearing on page 43 identifies which of the three ACTIONS goes with each of the three INPUTS and provides procedural details as to how these differing ACTIONS should be carried out.

3. Generally, a decision matrix describes what ACTION should be taken for particular INPUT situations and how to take it.

4. Turn to page 44 in this volume for the description of a third and last type of matrix.

C.1.2

DECISION MATRIX

DETERMINING HOW TO SEQUENCE SUB-CRITERION BEHAVIORS BEARING EACH OF THREE POSSIBLE RELATIONS TO ONE ANOTHER

CONDITIONS	1 Sub-Criterion Behaviors SHARE COMMON ELEMENTS	2 One Sub-Criterion Behavior PROVIDES AN INPUT to another Sub-Criterion Behavior	3 One Sub-Criterion Behavior IS A PREREQUISITE for another Sub-Criterion Behavior
ACTION TO TAKE	-Sequence task analysis results for elements shared with several sub-criterion behaviors FIRST in line -(Subsequently, instruction for these elements will precede instruction for the intact sub-criterion behaviors) -Sequence results for sub-criterion behaviors proper (with duplicate results inserted for elements removed) according to recommendations in other columns	-Sequence task analysis results in the order in which sub-criterion behaviors are to one another in usual performance:* ••Sub-criterion behaviors which provide an INPUT to another sub-criterion behavior are sequenced BEFORE the sub-criterion behavior to which it makes an INPUT ••Sub-criterion behaviors which take as INPUTS OUTPUTS from another sub-criterion behavior are sequenced AFTER the sub-criterion behavior whose OUTPUT provided the INPUT	-Sequence task analysis results for sub-criterion behaviors in the direction of the contingent relationship: ••Prerequisite sub-criterion behaviors BEFORE the sub-criterion behavior which is contingent on it ••The sub-criterion behavior contingent on another sub-criterion behavior AFTER the sub-criterion behavior on which it is contingent -The subsequent sequencing of instruction will follow this order

*Ultimate sequencing decisions are made in TASK G

EXAMPLES	e.g., -The concepts (discriminations, generalizations, associations, and chains) appear in most of the ten TASKS described in the ten volumes of this HANDBOOK -It is likely to be effective (facilitative) and efficient to teach them first (no matter whether instruction begins with TASK A or with TASK J)	e.g., -The ten major tasks identified in this HANDBOOK (i.e., A-J) (if treated as sub-criterion behaviors) provide INPUTS to one another and therefore would be sequenced in the order A through J -In TASK G, it might subsequently be decided to teach them in the order J through A	e.g., -If it were judged that "preparatory instructional materials" is a prerequisite for "revising instructional materials," then then would be sequenced with "preparation" coming beforehand (i.e., first) (No such assumption is necessarily being proposed here)

A STANDARDS MATRIX

1. The standards matrix, an example of which appears on page 45, provides the developer with criteria for determining whether the ACTION he has taken has produced an acceptable OUTPUT.

2. Fold back foldout page 39 and then continue the orientation exercise on page 47 of this volume.

C.1.2

STANDARDS MATRIX

ASSESSING THE ADEQUACY OF PROCEDURES FOR SEQUENCING SUB-CRITERION BEHAVIORS

PROPERTIES	COMPLETENESS	RELEVANCE
CRITERIA	-*All relevant task analysis results (on complete sets of FORM A.5(4) or (11)) are reviewed*	-*Task analysis results are reviewed for relevant conditions:* ••*Shared elements* ••*OUTPUTS of one sub-criterion behavior providing an INPUT to another sub-criterion behavior* ••*Prerequisite/contingent relationship between sub-criterion behaviors*

2d. Indexing the Handbook

Three major types of indexes occur in the HANDBOOK, all of which are designed to assist you in finding information you deem necessary. They include:

- the index volume
- the STEP index
- the Sub-Step index
- background information
- job procedures

THE INDEX VOLUME (The "X" volume)

1. The index volume contains a series of two facing pages for each STEP in the development process (the illustration on page 49 opposite having compressed an example onto one page).

2. The left-hand page identifies the Sub-STEPS involved in the STEP. The right-hand page provides a page INDEX identifying by page number the content to be found in matrices available to help guide the developer in the performance of each Sub-STEP.

3. Note in the illustration that the left-hand side identifies Sub-STEP C.1.1 as "Sequence task analysis information describing all Sub-STEPS, etc."

4. Also note that on the right-hand side, under the heading "ACTION TO BE TAKEN," identifies pages 20 & 21 (in the "C" volume) as providing information on how to sequence vertical and horizontal task analysis results.

5. A pair of such pages occurs in the INDEX volume for each Sub-STEP. Briefly, look for a few such pairs in the "X" or INDEX volume of the HANDBOOK.

6. Continue the orientation exercise on page 50 of this volume.

STEP C.1

Sequence task analysis results for all the Sub-Criterion behaviors which make up each criterion behavior.

C.1.1 Sequence task analysis information describing all Sub-STEPS (or terminal behaviors) which make up each Sub-Criterion behavior.

C.1.2 Sequence task analysis information describing all Sub-Criterion behaviors which make up each criterion behavior.*

*There is ample opportunity during TASK "G" (STRATEGY FORMULATION) to change sequencing decisions in light of additional information.

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STEP C.1

PAGE INDEX

	CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
C.1.1	-MATRIX: What are vertical and horizontal results . . 18, 19	-MATRIX: How to sequence vertical and horizontal task analysis results . . 20, 21	-MATRIX: Adequacy of sequencing of task analysis results 25	SUMMARY OF PROCEDURES . . 24
C.1.2	-MATRIX: Relationships which may exist among sub-criterion behaviors . . . 32	-MATRIX: Sequencing sub-criterion behaviors based on their relationships . 34	-MATRIX: Adequacy of sequencing of task analysis results 39	SUMMARY OF PROCEDURES . . 38

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STEP INDEX

1. At the beginning of a HANDBOOK section devoted to a STEP there are two facing pages (the illustration on page 51 opposite having compressed an example onto one page). Together they comprise a STEP INDEX.

2. The left-hand page identifies the Sub-STEPS included in the STEP. The right-hand page provides a page INDEX identifying by page number the content to be found in matrices available to help guide the developer in the performance of each Sub-STEP.

3. Use your HANDBOOK sub-volume "C" for a brief review of several examples of the STEP INDEX. Look at pages: 6 & 7, 44 & 45; and 68 & 69.

4. Continue the orientation exercise on page 52 of this volume.

EXAMPLE

STEP [ ]

OVERVIEW

INPUT	ACTION	OUTPUT
Task analysis results for each CRITERION behavior	Sequence results separately for each sub-criterion behavior and then for all sub-criterion behaviors	A sequence of results of behaviors ordered so as to maximize: ··Prerequisite effects ··Facilitative effects

All task analysis results [FORM A.5(4) or (11)] for all elements of a sub-criterion behavior i	Sequence task analysis results ii	Sequencing of vertical and horizontal task analysis results iii
All task analysis results [FORM A.5(4) or (11)] for: constituent sub-criterion behaviors and criterion behaviors iv	Sequence task analysis results v	Sequence depending on relationship among sub-criterion behaviors vi

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STEP C.1

PAGE INDEX

	CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
C.1.1	-MATRIX: What are vertical and horizontal results . . 19, 19	-MATRIX: How to sequence vertical and horizontal task analysis results . . 20, 21	-MATRIX: Adequacy of sequencing of task analysis results 25	SUMMARY OF PROCEDURES . . 24
C.1.2	-MATRIX: Relationships which may exist among sub-criterion behaviors . . . 32	-MATRIX: Sequencing sub-criterion behaviors based on their relationships . 34	-MATRIX: Adequacy of sequencing of task analysis results 39	SUMMARY OF PROCEDURES . . 38

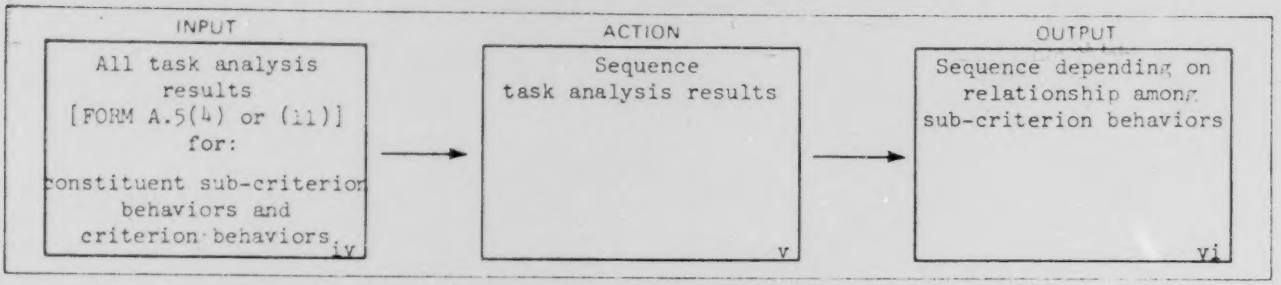
7

A SUb-STEP INDEX

1. The beginning of a HANDBOOK section devoted to a Sub-STEP is identified by a marker page like the one opposite on page 53.*
2. Note in the middle section labeled "Job Aid Contents" that an INDEX is provided to information relevant only to a particular Sub-STEP.
3. Use your HANDBOOK sub-volume "C" for a brief review of examples of such pages. Look at pages: 15, 27, 47, 57, 75, & 85.
4. Continue this orientation exercise on page 54 of this volume.

Marker pages are preceded by an overview page.

DESCRIPTION OF Sub-STEP	C.1.2



Job Aid Contents

CRITERIA FOR IDENTIFYING INPUTS	ACTION TO BE TAKEN	STANDARD FOR OUTPUTS	FORMS TO USE
-MATRIX: Relationships which may exist among sub-criterion behaviors . . . 32	-MATRIX: Sequencing sub-criterion behaviors based on their relationships . 34	-MATRIX: Adequacy of sequencing of task analysis results 39	SUMMARY OF PROCEDURES . . .38

Required Materials

COMPLETED MATERIALS	STEP	COMPLETED FORMS	STEP	BLANK FORMS
		Task analysis results (carried forward from)	C.1.1	

BACKGROUND INFORMATION AND JOB PROCEDURES

1. As illustrated in the example opposite, a summary index of two types of information is provided in the HANDBOOK.

2. At the beginning of each section devoted to a Sub-STEP there appears an index to what is called "background information." Toward the end of the same section devoted to a Sub-STEP there appears an index to what is called "job procedures." *

3. Use your HANDBOOK subvolume "C" for a brief review of examples of such pages. Look at pages: 17 & 23; 29 & 35; 49 & 53; 59; 77 & 81; and 87.

4. Continue this orientation exercise on page 57 of this volume.

*The HANDBOOK may omit one or the other of these types of indexes for some Sub-STEPS.

BACKGROUND INFORMATION

	page
Relationship between sub-criterion behaviors and criterion behaviors	30
Sequencing the task analysis results for separate sub-criterion behaviors and the criterion behavior based on them	31
Three conditions to consider in sequencing sub-criterion behaviors relative to one another	32, 33
Determining how to sequence sub-criterion behaviors, given each of the three conditions	34

JOB PROCEDURES

	page
Information to review in order to make sequencing decisions	37
SUMMARY OF PROCEDURES	38
Adequacy of procedures for sequencing task analysis results for constituent elements of a criterion behavior	39

2e. A Sequence of Types of Information Available in the HANDBOOK

The review so far has introduced you to all the types of information available in the HANDBOOK. Now, you will be able to see how they are all organized and sequenced.

There are comparable types of information available for each Sub-STEP in the development process. A section of the HANDBOOK devoted to a Sub-STEP follows the same sequence of types of information as do all sections devoted to other Sub-STEPS.

The next page is designed to take you through one typical sequence. Use HANDBOOK sub-volume "C" for this review.

SEQUENCE OF INFORMATION

1. Open sub-volume "C" to page 27. This is the type of page which marks or identifies the beginning of a section devoted to a particular Sub-STEP (here Sub-STEP C.1.2).

2. Page 28 presents a job diagram and a detailed job diagram giving you an overview of the procedures involved in the Sub-STEP.

3. Page 29 provides an index to the types of background information in the Sub-STEP available in the HANDBOOK.

4. Pages 30 through 34 present the actual background information.

5. Page 35 provides an index to the types of job procedure information available.

6. Pages 37 through 39 present the job procedure information. In this example it includes:

   ··on page 37 — a decision matrix;

   ··on page 38 — a summary of the procedures involved in doing the Sub-STEP; and

   ··on page 39 — a standards matrix identifying what should be accomplished and how well.

7. Continue this orientation exercise on page 61 of this volume.

USE HANDBOOK

SUB-VOLUME "C"

FOR THIS REVIEW.

2f. Changing Needs for HANDBOOK Information

Your need for the types of information provided in the HANDBOOK volumes and in the INDEX will change as a function of the increase in experience you will gain.

Some recommendations are provided for likely changing needs in your use of:

- background information and job procedure information;
- the INDEX sub-volume "X".

BACKGROUND INFORMATION AND JOB PROCEDURE INFORMATION

1. As you begin training in the materials development process, you will have to rely on both "background" and "job procedures" information in order to be able to do the WORKBOOK exercises, the FINAL EXERCISES, and any materials development you may be doing on the job.

2. As you become more proficient, you will find less and less need for the "background" information. The sections on "job procedures" may be all you will need.

3. Ultimately, you may need only the INDEX volume of the HANDBOOK to be used simply as a checklist of all the Sub-STEPS which need to be performed. Should you need information on a specific point or procedure, the INDEX sub-volume also identifies by page number the type of available information which bears on a particular Sub-STEP.

THE INDEX SUB-VOLUME

The INDEX volume is also useful when you are just beginning to take this program. *Turn to pages C-4 and C-5 in the INDEX volume.* Note that these pages provide an overview to the two Sub-STEPS that make up STEP C.1.

The usefulness of the INDEX derives from the overview these pages provide for the entire STEP C.1 so that, as you work on detailed portions of HANDBOOK "C" associated with Sub-STEP C.1.1, it is still possible to keep in mind where in the total STEP it fits. When you move on to portions of the HANDBOOK associated with Sub-STEP C.1.2, you similarly continue to be oriented to its place in the sequence of development events.

When you move on to portions of the HANDBOOK associated with Sub-STEP C.2.1 and then C.2.2, it is recommended that you open the INDEX volume to pages C-6 and C-7 *(Do this now)* and keep it before you. They provide an overview of the entire STEP C.2, with its constituent Sub-STEPS identified and sequenced.

It is recommended that, as you read the HANDBOOK materials associated with each Sub-STEP (whether it is A.2.1, A.4.3, B.4.5, or C.3.2, etc.), you keep the INDEX volume open to the page that summarizes the STEP of which the Sub-STEP is a part.

These overview pages in the INDEX volume also provide a table of contents for the diagrams which appear in the body of the HANDBOOK.

NOTE: The INDEX volume also contains a GLOSSARY. Look at the GLOSSARY which appears before the section in the INDEX volume devoted to the very first TASK.

Continue the orientation on page 64 of this volume.

Where You Are Now

Section:

#1 OVERVIEW
#2 HANDBOOK
#3 WORKBOOK
#4 FINAL EXERCISES
#5 KEY CONCEPTS

Section (3)

DESCRIPTION OF THE WORKBOOK	Page
3a. Types of Practice Problems	 67
3b. Procedures to follow	 75

3a. Types of Practice Problems

The WORKBOOK provides you with an opportunity to practice applying what you have been reading about in the HANDBOOK. Following the completion of a HANDBOOK section you are guided to one or more practice exercises.

Usually with each set of exercises practice is sequenced such that the tasks required of you become progressively more demanding. The typical sequence includes:

- practice at the recognition level
- practice at the editing level
- practice at the production level

THE "RECOGNITION" PRACTICE ITEM

1. The task in a multiple choice practice item is to recognize which of two or more options is the correct one.

2. In the illustration on the opposite page, the task is to recognize (and identify with an X) which of the two examples represents a leaner instructional sequence.

3. For additional varieties of RECOGNITION formats open the WORKBOOK and briefly look at the following sample pages: J-6, J-14, and J-24.

4. Continue the orientation on page 70 in this volume.

EXERCISE 4B

Your task in this exercise is to put an X through the example which represents a leaner instructional sequence.

	Leanness Affected By:	Example #1	Example #2
1.	Number of repetition items	Figure 1 INPUT 1a.ii appears in three practice items	Figure 1 INPUT 1a.ii appears in two practice items
2.	Number of repetition items	Figure 1 Each INPUT to be recalled has 2 practice items devoted to it	Figure 1 Some INPUTS to be recalled have 2 practice items and some 3 practice items devoted to them
3.	Number of examples	Figure 1 INPUT class 1a is represented by practice items with 2 transfer examples, 1b by 3 transfer examples	Figure 1 INPUT class 1a is represented by practice items with 4 transfer examples, 1b by 6 transfer examples
4.	Number of review items	Figure 1 INPUTS 1a.i, 1b.i, 1b.ii, and 3 TRANSFER INPUTS are reviewed in one practice item (each)	Figure 1 All recall INPUTS and five transfer INPUTS are reviewed in one practice item (each)
5.	Number of review items	Figure 1 Three review practice items appear at three different times in an instructional sequence	Figure 1 Three review practice items appear at two different times in an instructional sequence

I-28

SEE ANSWERS

THE "EDITING" PRACTICE ITEM

1. The task in an editing practice item is to make a change in material presented to you. It is not as difficult as the task of producing material yourself. But, it is more difficult than simply recognizing which of several options is the correct one. Therefore editing practice represents a middle difficulty position in the practice sequence.

2. The opposite page provides an example of the type of editing (or changing) you may be required to do.

3. Continue the orientation on page 72 of this volume.

Your task in this exercise is to make a change in an instructional sequence making it leaner.

	Leanness Affected By:	INSTRUCTIONAL SEQUENCE NOW	Your Change
1.	Number of repetition items	Figure I There are two practice items for each of the following INPUTS: 1a.i, 1a.ii, 1b.i, and 1b.ii	
2.	Number of examples	Figure I There are practice items containing transfer examples: 3 for INPUT class 1a and 4 for INPUT class 1b	
3.	Number of review items	Figure I Each recall example and each transfer example used is reviewed on two separate occasions	
4.	Number of examples	Figure I The INPUT classes are represented by a series of 20 practice items, each containing a different example	
5.	Number of practice items	Figure II Each type of practice item (A-I) is represented by three practice items	

SEE ANSWERS

THE "PRODUCTION" PRACTICE ITEM

1. The task in a production item is to create or develop your own materials according to specifications provided. There are no choices among options to make as in the recognition item. Nor is there an option which has to be changed. You have to create your own answer (materials).

2. The practice items on the opposite page illustrate the requirement of creating a demonstration or an example (in the right-hand column) which will assist a learner to engage in the type of performance described in the left-hand column.

3. Continue the orientation on page 75 in this volume.

EXERCISE 5H: CUES

For each of the following examples produce a demonstration, model, or example which is designed to assist the learner to practice criterion performance.

	Criterion Performance	Demonstration or Example
1.	A man must take all the steps involved in removing and replacing a faulty automotive ignition coil.	
2.	Student actor has to act in a restoration play and perform in a stylyzed way appropriate to play.	
3.	A biology student must put a slide on a microscope and adjust the view.	
4.	Student has to write paragraph which meets formal property requirements (e.g., organization, length, etc.)	
5.	A student lifeguard must learn to jump into the water and get to the victim in the quickest possible way.	

SEE ANSWERS

3b. Procedures to Follow

Taking this program involves a relatively simple and repetitive routine:

(1) read assigned HANDBOOK sections;

(2) do related WORKBOOK problems;

(3) check the answers provided in the WORKBOOK;

(4) read the next HANDBOOK section (and so on) until you complete a sub-volume.

Information about these activities follows:

- ··reading the HANDBOOK
- ··doing WORKBOOK problems
- ··checking answers
- ··following a prescribed schedule

READING HANDBOOK SECTIONS

1. The prescribed schedule of activities (see later) will instruct you to read one or more sub-sections of the HANDBOOK (like those you reviewed earlier). Each sub-section may consist of a half-dozen pages or it may be as long as a few dozen pages.

2. You are allowed (and indeed encouraged) to refer back to the HANDBOOK pages as you do WORKBOOK exercises. It is this constant availability of the reference capability of the HANDBOOK that will permit you to cover large amounts of HANDBOOK material before you begin practicing the procedures it describes.

3. Do not write in the HANDBOOK. Write only in the WORKBOOK. For example, if you come across a diagram with blanks in it (like the one at the top of the opposite page), you are not required to fill it in. It is there only as an illustration. Or if there are practice items in the HANDBOOK (like those at the bottom of the opposite page), they too are there for illustrative purposes. Do not do these items in the HANDBOOK. Write answers only in the WORKBOOK. You may wish, however, to write your own notes in the HANDBOOK.

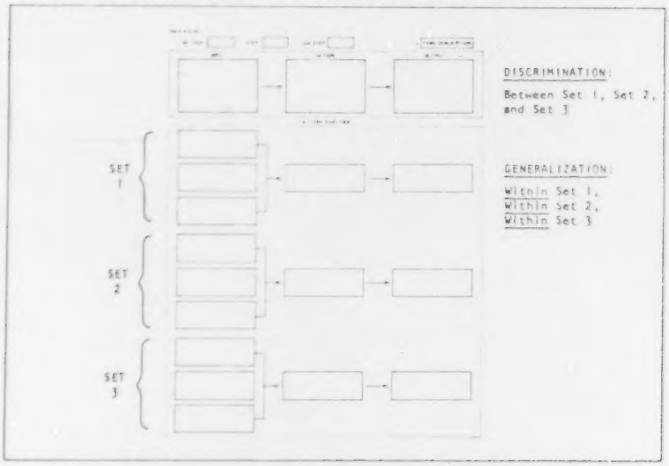
4. Continue the orientation on page 78 of this volume.

B.4.2 DETERMINING WHICH PORTION OF FORM A.5(4) TO USE IN DIAGRAMMING DISCRIMINATIONS AND GENERALIZATIONS

DECISION MATRIX

CONDITIONS	A DISCRIMINATION among INPUTS to be diagrammed	A GENERALIZATION across INPUTS to be diagrammed
ACTION TO TAKE	-Describe two or three *different specific inputs* or two or three *different input classes* in two or three separate *sets* of *rectangles* in the *INPUT column.** -*If there are additional different inputs to be discriminated from the two or three already recorded, use Supplementary FORM A.5(5).* *(See page 169.)*	-Describe two or three *examples of each input class* in each *single set of rectangles* in the *INPUT column.* -*If there are more examples to be recorded within each class, use Supplementary FORM A.5(6).* *(See page 169.)*

*See Section B.3.6 for definition of specific inputs and input classes.



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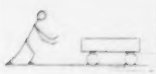
J.2.5 EXAMPLES ILLUSTRATING HOW WEAKNESSES OF INDIVIDUAL PROGRAM PROBLEMS OR TASKS CAN BE OVERCOME BY CHANGING CUING

EXAMPLES

LEVELS OF CUING	ORIGINAL PROBLEM	MORE CUING	STILL MORE CUING
#1	 The man has just applied a force to the cart. In what direction must the cart be moving? _____	The man has just pushed the cart. In what direction must the cart be moving? _____	The man has just pushed the cart. The cart must be moved in the same direction. In what direction must the cart be moving? _____
#2	Concentrate on making a correct loop (as you thread this film projector).	Concentrate on making a loop (as you thread this film projector). Make sure the loop is neither too long nor too short.	Concentrate on making a loop (as you thread this film projector). Make sure the loop does not exceed these guide marks. (Guide marks provided)
#3	What class of lever is this?	What class of lever is this? A substitution of example makes this an easier problem.	Note that the resistance force is between the fulcrum and effort force. What class of lever is this?

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DOING WORKBOOK PROBLEMS

1. All problems in the WORKBOOK are of the recognition, editing, or production variety.

2. For recognition items use X's or letters (as per instructions) in the blanks provided (see top of opposite page).

3. For editing or production items write in your answer in the spaces provided (see bottom of opposite page).

4. Sometimes your task will be to review practice items that are examples taken from other programs (see top of opposite page). Your task is not to answer the questions posed within such items Your task is (usually) to categorize the item by type. In the example shown, your task is to indicate which of the items (A, B, or C) provides the most, intermediate, and least amounts of assistance.

5. Continue the orientation on page 80 of this volume.

EXERCISE 1A

Your task is to identify by letter the practice problem which provides the most, least, and intermediate amounts of assistance to the student who has to learn to DISCRIMINATE between INPUTS.

Put a letter (A, B, or C) in each of the last three columns.

	A.	B.	C.	Degree of Assistance: MOST	INTERMEDIATE	LEAST
1.	The number of things is often a clue that a noun is plural. Which is plural? __one girl __three girls	Which is plural? __cat __cats	Most plural nouns have an "s" at the end; e.g., one boy - two boys. Which is plural? __one dog __two dogs			
2.	"Mixed" fractions have different denominators, e.g., mixed - 2/3 and 1/4, unmixed - 2/3 and 1/3. Characterize these fractions: 2/6 and 1/3 __mixed __unmixed	Check the sameness or difference of denominators in these two fractions: 7/8 and 5/8. The fractions are: __mixed __unmixed	The fractions 5/6 and 5/7 are: __mixed __unmixed			
3.	Notice where the loops are in these letters: b and d. The letters are: __the same __different	These letters: b and d are: __the same __different	The loop in this letter b is to the right. The loop in this letter d is to the left. Therefore, the letters b and d are: __the same __different			
4.	Observe the angles here: The number of right triangles shown is/are: __one __two	Any triangle with a 90° angle is called a "right" triangle. The number of right triangles here is/are: __one __two	The number of right triangles shown is/are: __one __two			
5.	See my tongue between my teeth as I say "th." When I say "f," it's different. Now listen (same sounds as in B). Are they the same or different?	(Orally presented "f" and unvoiced "th" sounds) Are these the same or different sounds?	Watch my lips and tongue as I make these two sounds (same sounds as in B). Are the sounds the same or different?			

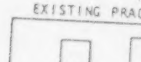
SEE ANSWERS

EXERCISE 1B

The practice problems in Column A were designed to teach DISCRIMINATIONS; but they resulted in errors.

Your task in Column B is to revise the problem by adding assistance (as little as necessary).

Your task in Column C is to develop a new item using a different example (with the amount of assistance provided being roughly comparable to that provided in the practice item you created in Column B.

	A. EXISTING PRACTICE PROBLEM	B. Your Revision	C. Your New Item
1.	 These two figures are of: __the same type X different types		
2.	"Personal" tax reduction and lowered interest rates are financial measures of: __the same type X different types		
3.	(A baseball pitched toward the plate) Is that a: X strike __ball		
4.	Identify the prime number. X 13 __neither __9 __both		
5.	Are the instructions provided by these symbols Σx^2 $(\Sigma x)^2$ __the same X different		

SEE ANSWERS

CHECKING YOUR ANSWERS

1. Practice problems or items are grouped into exercises. Following each exercise there appears an ANSWER page.

2. The purpose of the answer page is to provide you with feedback about the correctness or acceptability of your answers.

   2a. Only for recognition items is there clearly a right or wrong answer (see top of opposite page).

   2b. For editing and production items there can be no clearly right or wrong answers. Your answers should be like the recommended ones (see bottom of opposite page). Often you will have to be the judge as to whether your answer is acceptable or not. The criteria provided in the HANDBOOK can assist you in making the judgment.

3. For exercises which have multiple items, you have the option of checking your answer in one of two ways:

   3a. You can look up an answer after each item is completed; or

   3b. You can look up the answers after all items in the exercise are completed.

   If you are unsure of a problem and its answer you might wish to try option 3a. otherwise, 3b. might be preferable.

4. WORKBOOK problems are of value only if they are attempted before looking at the answer page. Having the HANDBOOK available at all times should be the only assistance you are likely to need while doing the problems.

5. Continue the orientation on page 82 of this volume.

ANSWERS

EXERCISE 1A

Your task is to identify by letter the practice problem which provides the most, least, and intermediate amounts of assistance to the student who has to learn to DISCRIMINATE between INPUTS.

Put a letter (A, B, or C) in each of the last three columns.

	A	B	C	Degree of Assistance: MOST	INTERMEDIATE	LEAST
1.	The number of things is often a clue that a noun is plural. Which is plural? __one girl __three girls	Which is plural? __cat __cats	Most plural nouns have an "s" at the end; e.g., one boy - two boys. Which is plural? __one dog __two dogs	C	A	B
2.	"Mixed" fractions have different denominators; e.g., mixed - 2/3 and 1/4, unmixed - 2/3 and 1/3. Characterize these fractions: 2/6 and 1/3 __mixed __unmixed	Check the sameness or difference of denominators in these two fractions: 7/8 and 5/8. The fractions are: __mixed __unmixed	The fractions 5/6 and 5/7 are: __mixed __unmixed	A	B	C
3.	Notice where the loops are in these letters: b and d. The letters are: __the same __different	These letters: b and d are: __the same __different	The loop in this letter b is to the right. The loop in this letter d is to the left. Therefore, the letters b and d are: __the same __different	C	A	B
4.	Observe the angles here: The number of right triangles shown is/are: __one __two	Any triangle with a 90° angle is called a "right" triangle. The number of right triangles here is/are: __one __two	The number of right triangles shown is/are: __one __two	B	A	C
5.	See my tongue between my teeth as I say "th." When I say "f," it's different. Now listen (same sounds as in B). Are they the same or different?	(Orally presented "f" and unvoiced "th" sounds) Are these the same or different sounds?	Watch my lips and tongue as I make these two sounds (same sounds as in B). Are the sounds the same or different?	A	C	B

DO NEXT PROBLEM

ANSWERS

EXERCISE 1B

The practice problems in Column A were designed to teach DISCRIMINATIONS; but they resulted in errors.

Your task in Column B is to revise the problem by adding assistance (as little as necessary).

Your task in Column C is to develop a new item using a different example (with the amount of assistance provided being roughly comparable to that provided in the practice item you created in Column B.

	A. EXISTING PRACTICE PROBLEM	B. Your Revision	C. Your New Item
1.	 These two figures are of: __the same type X different types	Notice the equal lengths on all four sides. Are these figures __the same type __different types	Notice the unequal lengths in Figure B. A B Are they of: __the same type __different types
2.	"Personal" tax reduction and lowered interest rates are financial measures of: __the same type X different types	Distributing money to consumers and to investors differs. "Personal" tax reduction and lowered interest rates are: __same type X different types	Distributing money to consumers and to investors differs. Lowered interest rates and government-financed housing projects are measures of: X same type __different types
3.	(A baseball pitched toward the plate) Is that a: X strike __ball	The ball has to come above the knees. (A baseball pitched toward the plate) Is that a: __strike X ball	The ball has to come below the shoulders. (A baseball pitched toward the plate) Is that a: X strike __ball
4.	Identify the prime number. X 13 __neither __9 __both	A prime number cannot be factored. Identify the prime number. X 13 __neither __9 __both	A prime number cannot be factored. Identify the prime number. __7 __neither __11 X both
5.	Are the instructions provided by these symbols $(x)^2$ $(x)^2$ __the same X different	Note that the exponent is outside the parentheses. Are the instructions provided by these symbols x^2 $(-x)^2$ __the same X different	Note that the exponent is outside the parentheses. Are the instructions provided by these symbols $x^2 + y^2$ $(x + y)^2$ X the same __different

DO NEXT PROBLEM

FOLLOWING A PRESCRIBED SCHEDULE

1. To make sure that you coordinate the reading of appropriate HANDBOOK sections and doing WORKBOOK exercises, a schedule of activities like the one on the opposite page appears at the beginning of major sections of the WORKBOOK.

2. Note in the illustration that the following types of information are provided:

   2a. You are told which section(s) of the HANDBOOK are to be read (top left).

   2b. Next to it (top right) you are told the number of the exercise(s) which is(are) to be done. Below that you are told what is covered in the exercise.

3. Open your WORKBOOK and find one or two of the blue divider pages. Open them up and briefly look at the schedules which appear on them.

4. After completing prescribed exercises, you then go on to read the next assigned HANDBOOK section(s), followed by their related exercises, and so on until all the exercises for each major TASK A, B, C, or D, etc., are completed.

5. Before going on to the next major task, do a final exercise on the TASK just completed. Turn to page J-61 in the WORKBOOK. Note the instructions at the end of the "J" to the effect that before going on, you should do FINAL EXERCISE #1 in the FINAL EXERCISES volume (to be discussed next).

6. Continue the orientation on page 85 of this volume.

After reading Handbook for *sub STEP(S)*: J.1.4 (only)

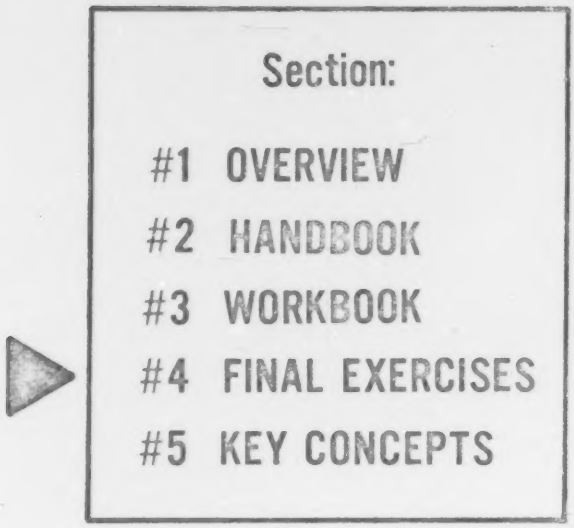
DO EXERCISE: 1

Exercises 1A-1I are designed to give you practice in revising program practice problems on which students have made errors.

EXAMPLE

TURN TO NEXT PAGE FOR PROBLEMS

Where You Are Now



Section (4)

DESCRIPTION OF THE FINAL EXERCISE

DOING THE FINAL EXERCISES

1. The opposite page is illustrative of the beginnings of each final exercise.

   1a. The top of the page tells you what sections of the HANDBOOK and WORKBOOK you should have completed before doing the FINAL EXERCISE.

   1b. The bottom of the page tells you what types of pre-prepared materials you will be given and what types of materials you will be expected to produce based on these pre-prepared materials. (Read this illustrative section on the opposite page.)

2. Briefly review pages 1.1 – 1.19 in the FINAL EXERCISE volume. It will give you an idea of the kinds of materials which will be provided to you and then what you will be expected to do.

3. Note that on page 1.19 of the FINAL EXERCISE volume you are told to refer to an ANSWER page only <u>after</u> you have completed the FINAL EXERCISE.

4. ANSWERS provided are illustrative (see page 1.21). You <u>will</u> have to evaluate your own answers using criteria provided in the HANDBOOK.

5. Continue the orientation on page <u>89</u> of <u>this</u> volume.

FINAL EXERCISE #1:
Making Revisions in an Instructional Program

Before doing this exercise, you should have completed the following tasks:

(1) Read HANDBOOK Section "J": EVALUATE INSTRUCTIONAL MATERIALS

and

(2) Do the WORKBOOK exercises associated with Section "J."

Your assignment in this exercise is to perform TASK J: "Making Revisions in an Instructional Program."

As a basis for performing this task, starting on page 1.3 you will be given completed results for prior TASKS in the materials development process.

Following your review of these results, you are to revise the instructional program which appears in the section beginning on page 1.13.

THE REPETITIVE SCHEDULE

1. Read a HANDBOOK section (identified on blue divider pages in the WORKBOOK).
2. Do the WORKBOOK exercises associated with it.
3. Then, read the next assigned HANDBOOK section.
4. Follow this with its associated WORKBOOK exercises.
5. Read the next assigned HANDBOOK section.
6. Do the WORKBOOK exercises associated with it.

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7. Repeat the above until you have completed all the assigned reading and exercises for the TASK covered in each HANDBOOK sub-volume.
8. Then, do the FINAL EXERCISE for that TASK.

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9. Go on to the next assigned TASK and repeat the above cycle: 1-8.

Where You Are Now

Section:

#1 OVERVIEW
#2 HANDBOOK
#3 WORKBOOK
#4 FINAL EXERCISES
#5 KEY CONCEPTS

Section (5)

KEY CONCEPTS IN THE DEVELOPMENT PROCESS

Purpose of This Section

Up until now this review has been designed to introduce you to the nature of the materials provided and to the procedures for using them. It has been a lengthy introduction. The novelty, complexity, and scope of the materials which make up this program warrant such length. The purpose of the orientation is to facilitate your use of the materials.

This section is concerned not with organization, format, or procedures but with content. It introduces key concepts which are used throughout the program and therefore are better learned first.

The orientation ends here. You begin the active learning process now. Turn to page 93 of this volume.

LEARNING ABOUT KEY CONCEPTS

1. You will now begin to follow the routine procedure of alternating between HANDBOOK and WORKBOOK.

2. Your first assignment is to:

   2a. Open HANDBOOK sub-volume "B" to page 130. Continue reading through page 160.*

   2b. Read pages 130-160 for an understanding of the concepts presented there; do not attempt to memorize definitions or examples.

   3c. After you have completed reading pages 130-160, do WORKBOOK exercises 6A and 6B on pages B-47 – B-57 in the WORKBOOK.

3. When this first assignment is complete, read the instructions on page 95 in this volume.

*Remember that this is an exercise taken out of context. Thus, when it refers to materials "you have already completed," it will not apply to you at this point in time.

You have now completed the activities provided in the ORIENTATION volume.

Check the schedule in the USER'S MANUAL for the activity scheduled next.

OPTIONAL

For those taking this program who wish to get an overview of the content the program contains (as opposed to an overview of the mechanics of taking the program, which the bulk of the ORIENTATION volume has treated thus far), now would be an appropriate time to do so. For this purpose, read:

> Gropper, G. L. Instructional Strategies. Englewood Cliffs, New Jersey: Educational Technology Publications (expected publication date: January 1974).

After reading this volume, proceed to the next scheduled activity identified in the USER'S MANUAL.